SU-6010 User's Manual

140409-V1.1

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Chapter 1 Features

●Supports Windows XP (x86), and Windows Vista / 7 / 8 (x86/x64).

●USB 2.0 High-Speed Connection to Host PC.

●Supports MMCA V.4.51, 3.3 or 1.8V eMMC.

●MMC Interface up to 8 bit, 50MHz bus.

●Supports eMMC BA/AA/AB/AC Types of BGA Packages.

●Supports eMMC proprietary POP Packages via external adapters. (Not included in the pacakge.)

●Supports eMMC BP, GP and ENH_USER Partition, Program and Verify.

●Supports Leap Electronic eMMC duplicator's Partition/Mirror/User/AutoScan Modes.

●Proprietary unitary file backup for all partition data, EXT_CSD settings, and checksum.

●Single partition access mode for BP, GP or user data supporting raw binary data.

●Easy to use, automatic parameter checking "eMMC Partition Settings" feature.

●Special BP1 + BP2 + User_Data mode.

●Special Bottom Align Mode.

Chapter 2 Introduction

SU-6010 USB Programmer is the handy tool for engineers working with eMMC. SU-6010 offers easy adaptation to all kinds of popular eMMC packages without needs for additional adapter. In case if other proprietary packages are used, SU-6010 provides SD/MMC socket for use with external adapter.

SU-6010 comes with easy-to-use application allows user to identify, partition, read, program and/or verify eMMC. In addition to proprietary Partition/Mirror/User/AutoScan mode that supports Leap eMMC duplicator and raw binary mode, SU-6010 also supports special B1/2+U and Bottom Align mode to support certain specific application processor requirement.

Chapter 3 Package Contents

●SU-6010 Programmer Base *1
●SU-6010 eMMC Adapter *1
●Guide Plate for eMMC Adapter *3 (18x12 / 18x14 / 13x11.5)
●USB Cable *1
●Power Cord *1
●USB Flash Drive *1 (Driver/Software/Manual included)

Chapter 4 Applications

4.1. Allows software engineer to know detail information of target device, by providing specific information of eMMC device being used. Among them, the most important device feature parameters are:

1. BOOT-1/2 Size: BOOT 1/2 Partition Size, which may vary among different devices.
2. Erase Group Size: Unitary block capacity when erase command received.
3. Write Protect Group Size: Unitary block capacity when write protect command received.

According to MMCA standard, definition of Erase Group Size and Write Protect Group Size, are defined by:

1. CSD[46:42] - ERASE_GRP_SIZE
2. CSD[41:37] - ERASE_GRP_MULT
3. CSD[36:32] - WP_GRP_SIZE
4. EXT_CSD[224] - HC_ERASE_GRP_SIZE
5. EXT_CSD[221] - HC_WP_GRP_SIZE

This information is related with following device feature interpretation or configuration settings:

1. EXT_CSD[159:157] - MAX_ENH_SIZE_MULT: Maximum Enhanced Size Supported.
2. EXT_CSD[154:143] - GP_SIZE_MULT: General Purpose Partition Size Configuration.
3. EXT_CSD[142:140] - ENH_SIZE_MULT: Enhanced User Size Configuration.
4. EXT_CSD[139:136] - ENH_START_ADDR: Enhanced User Area Region Start Address.

They are to be interpreted or configured as specified unitary size or boundary.

Unfortunately, due to potential changes of underlying NAND flash memory part, MMCA standard do not specify nor standardized these features.

There is various combination of different BOOT area size, and write protect group size in available devices. And hence any specific configuration must be targeted to a specific part.

And hence, for users that intend to utilize BOOT, GP or ENH_USER features of eMMC, prior knowledge of the specific device being used is necessary.

In addition, in the cases of:

1. Change of device vendor
2. Upgrade of device capacity
3. Vendor change device version, (embedded controller or NAND flash memory)

It is necessary to re-ensure these parameters and possibly necessary to re-define register settings, to meet customers desired features and operation.

4.2 Carry out complicated eMMC Partitioning Process.

SU-6010 provides ease of use partitioning settings interface to help user to configure the device without going through the highly complicated, error-prone process. (As specified in JEDEC MMCA Standard No. 84-A441 section 7.2.3, figure 19.)

4.3 Provide access to BOOT-1/2, GP-1/2/3/4 as well as USER_DATA partitions.

4.4 Offers one single file gathering all information needed to program/verify device.

After one master device is configured and programmed, SU-6010 allows user to read back data in all various partitions and configured EXT_CSD settings.

And, under user's preference, SU-6010 automatically integrate all user programmed data, generated checksum and well as configuration settings into one, single file with ".UPM" extension name.

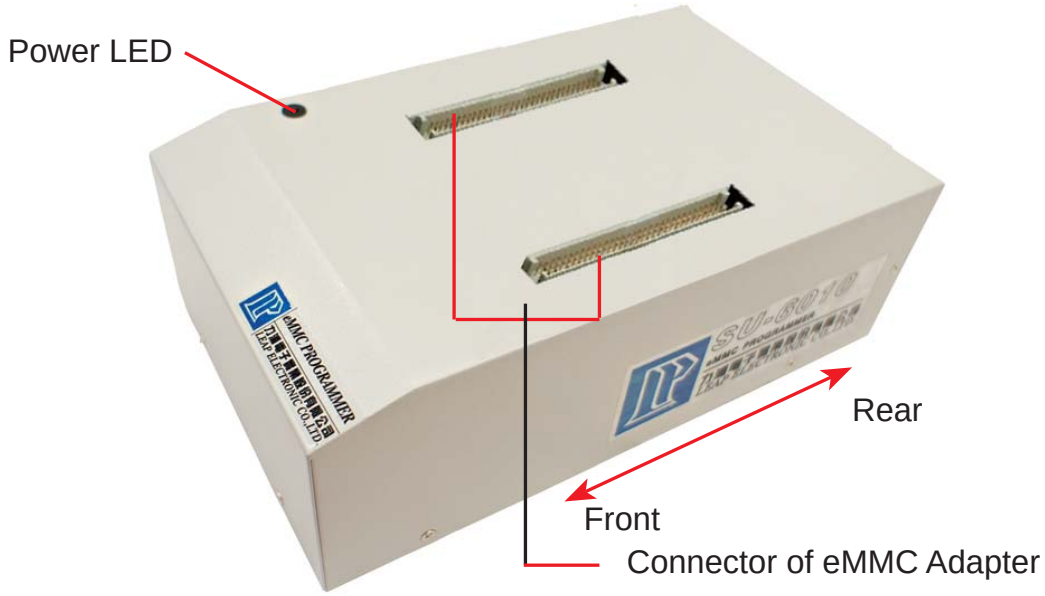
This ".UPM" file may easily be used in the future for:

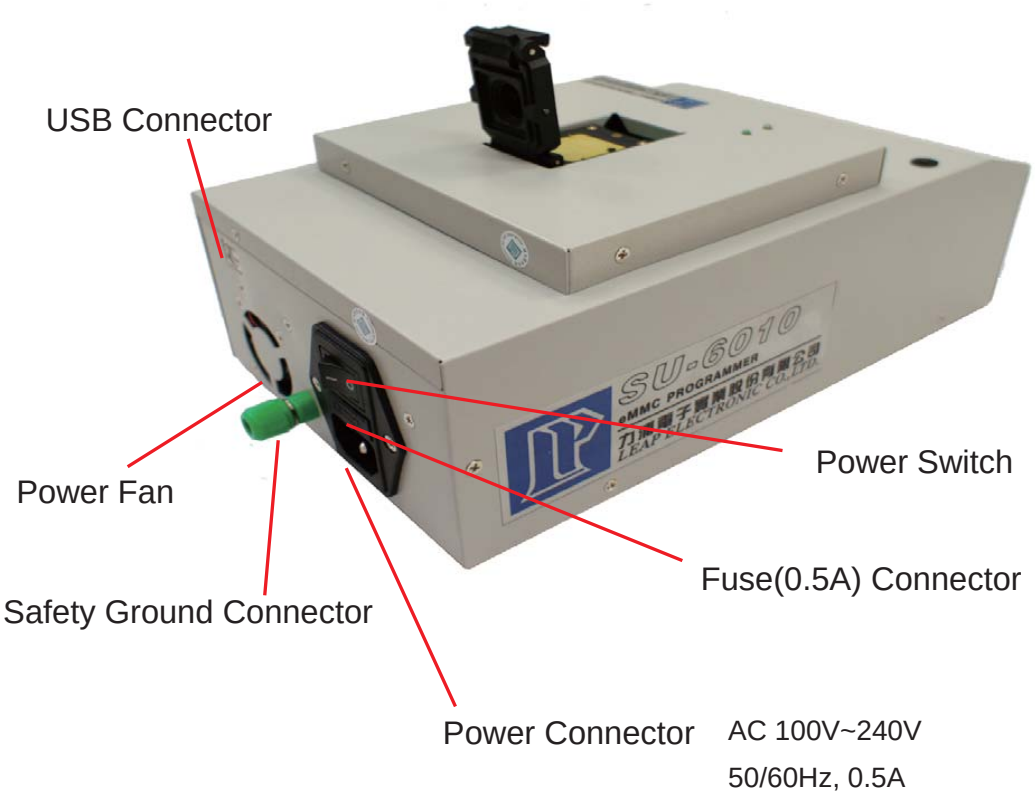
1. Device verification for pre-production verification, quality control or debugging.
2. Programming new master IC.

Coalescence of all information in one single file helps avoid the potential of error caused by miss-matching programming data in BIN file and separate configuration settings file.

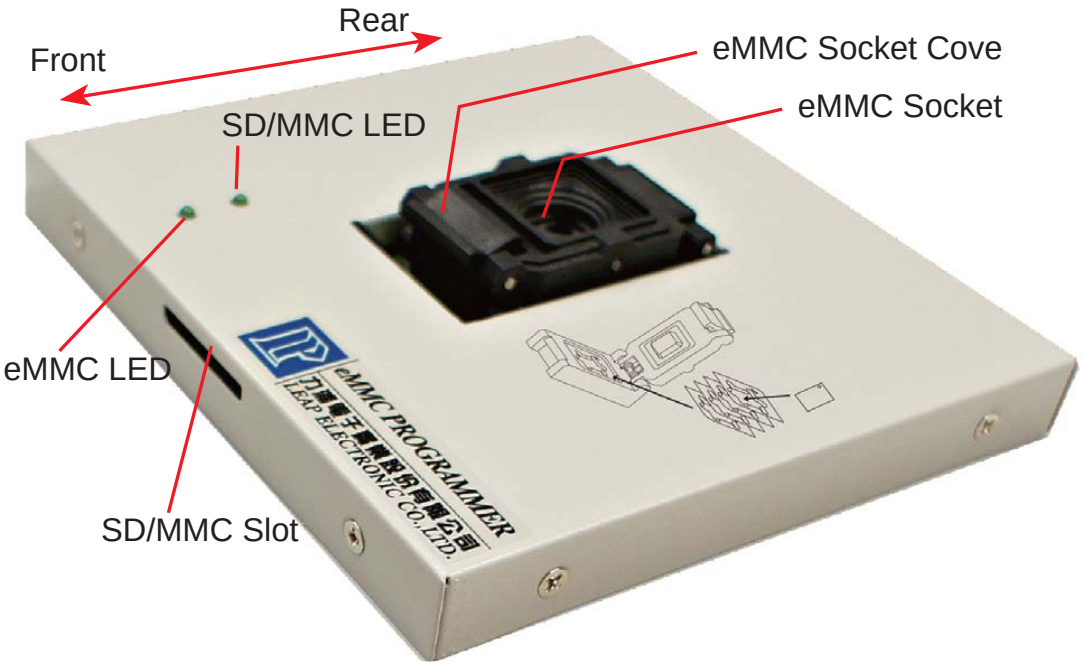
Due to the fact that there are many variation of device parameters, and potential changes of device; it is difficult for user to enter desired settings to be programmed without prior knowledge of target device.

Chapter 5 SU-6010 Programmer Base Overview

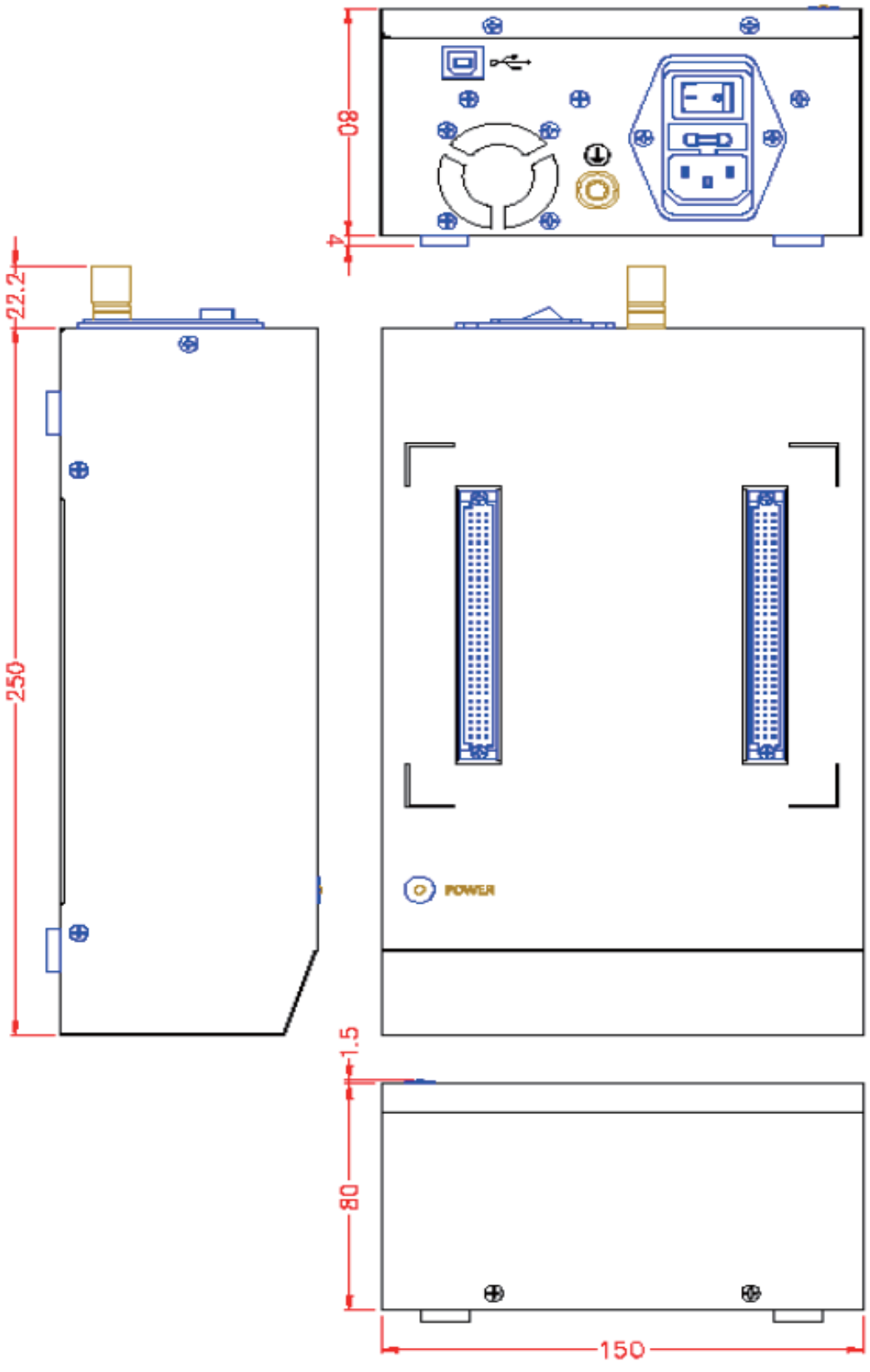


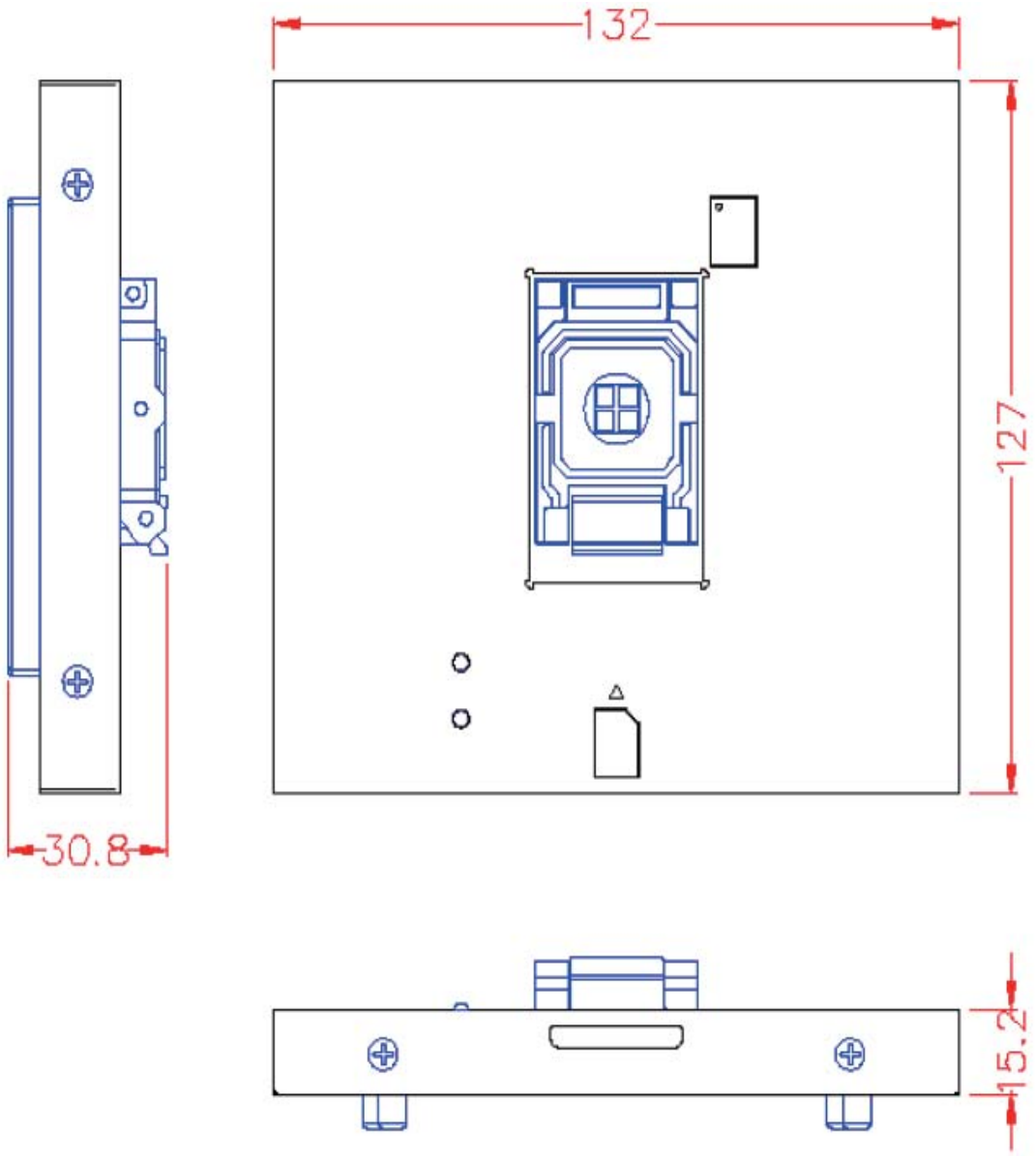


Chapter 6 SU-6010 eMMC Adapter Overview



Chapter 7 SU-6010 Dimensions




132
127
30.8
15.2

Chapter 8 SU-6010 Installation

8.1 SU-6010 Hardware Setup

Put the SU-6010 eMMC adapter on the top of the SU-6010 base and insert the adapter to the base. Connect the power cord to the power connector, and then connect the SU-6010 and PC with USB cable.

8.2 SU-6010 Device Driver Setup

Power on the PC and enter OS; power on the SU-6010, and then follow the instructions below.

●For Windows XP (x86)

The Windows “Add New Hardware Wizard” appears; then browse to:

“(the folder you save driver files)\Driver\XP\x86” folder and then follow the on-screen instructions.

●For Windows VISTA (x86 / x64)

The Windows “Add New Hardware Wizard” appears; then browse to:

“(the folder you save driver files)\Driver\Vista_7\x86” folder for x86 system or“(the folder you save driver files)\Driver\Vista_7\x64” folder for x64 system, and then follow the on-screen instructions.

●For Windows 7 & 8 (x86 / x64)

After the Windows indicates add device failed, enter “Device Manager” and double-click on the “Unidentified Device” or “SU-6010 ” and then click on the “Update Device Driver” button.

When the “Update Device Driver” dialog appears, browse to:

“(the folder you save driver files)\Driver\Vista_7\x86” folder for x86 system or“(the folder you save driver files)\Driver\Vista_7\x64” folder for x64 system, and then follow the on-screen instructions.

8.3 SU-6010 Programmer Application Setup

Browse to the “Setup” folder and double-click the “setup.exe” file to launch the setup program for SU-6010 Programmer Application; then follow the on-screen instructions to complete the setup progress. After the setup progress a icon named “C-Ming UPM” will show on the desktop, double click the icon to launch the program.

Chapter 9 SU-6010 Programmer Application

9.1 Main Control Panel

SU-6010 provides 8 functions for eMMC operation.

●IDENTIFY:

To identify and/or program device feature, parameters and settings.

●PARTITION:

To partition eMMC enhance user and/or general purpose partition settings.

●READ:

To read data from eMMC.

●PROGRAM:

To program data to eMMC.

●VERIFY:

To verify data in eMMC with specified file.

●AUTO:

To program and then verify eMMC.

●SCAN:

Scan entire valid user data in eMMC and store the scan result into eMMC instead of the scan operation in Leap eMMC duplicator.

●ERASE:

Erase data content of eMMC. (Including any scan result.)

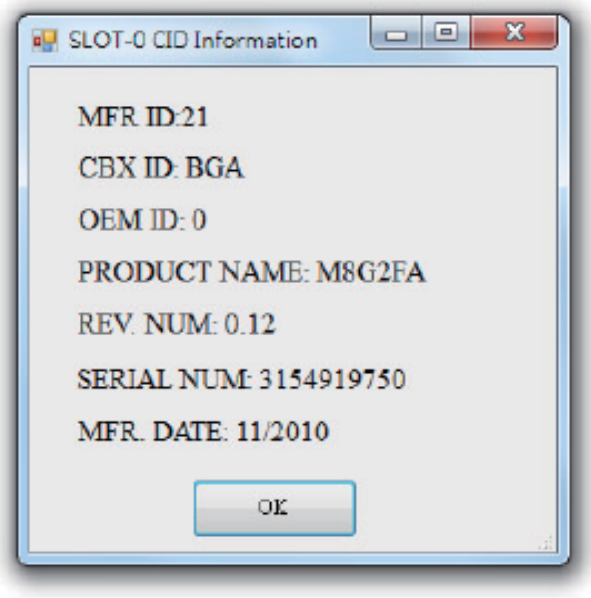
●Other Options:

1. If there's more than one SU-6010 connected to PC, you can select which SU-6010 to be controlled here.
2. Select the socket of SU-6010 to be operated; SLOT-0 for eMMC socket and SLOT-1 for SD/MMC slot.
3. The voltage from SU-6010 interface to flash IC and controller. In normal condition, VCC33/VCCQ33 support and hold a more steady operation, however it still depends on the reliability of flash IC.
4. Maximum operation clock frequency of SU-6010, it is recommended to select 50M for a better efficiency and access rate. However, if eMMC operation is through SD/MMC interface, lower options like 25M/400K may be required to ensure reliability.

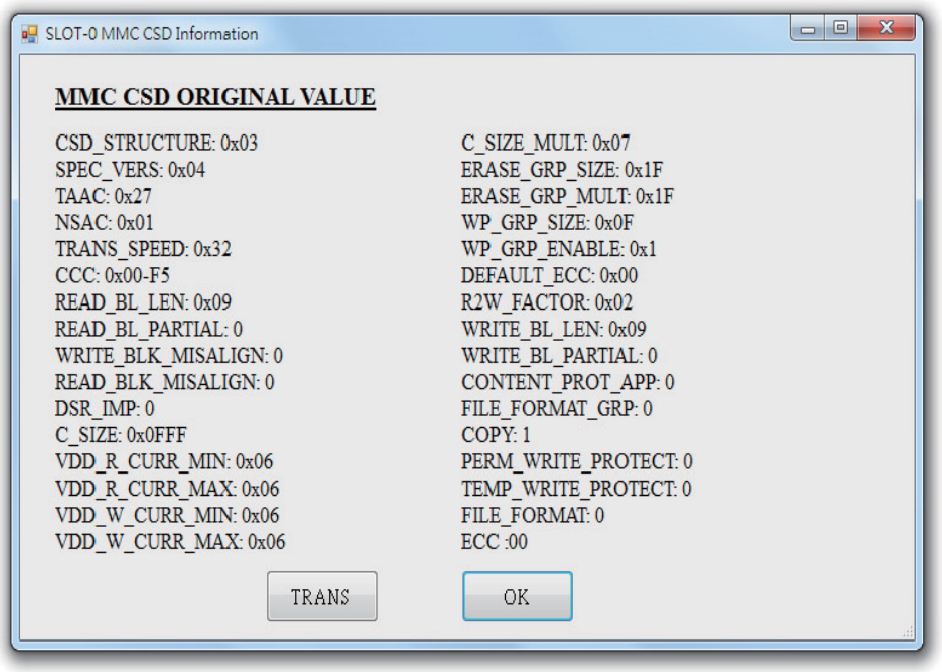
9.2 IDENTIFY

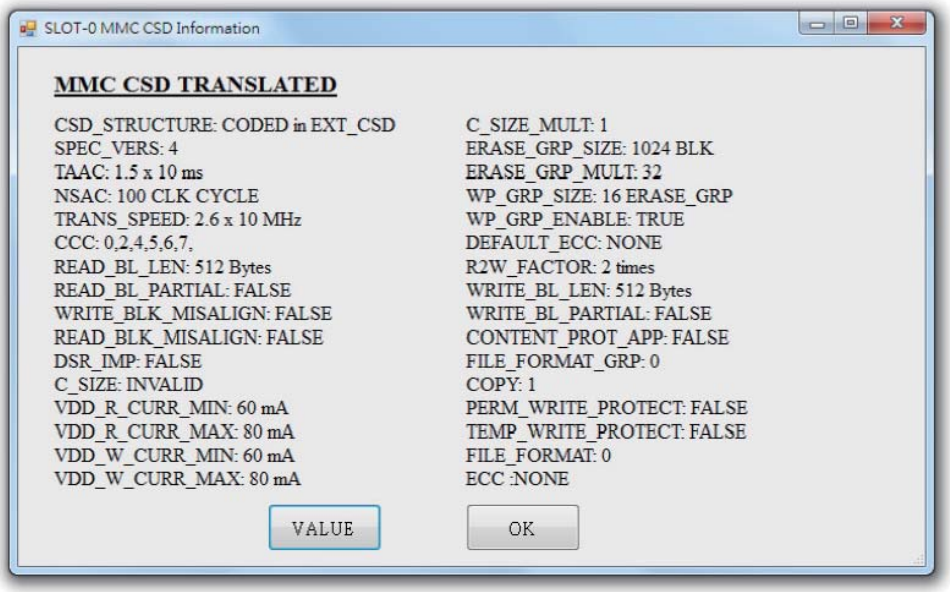
IDENTIFY function is used to identify and retrieve device feature and parameters including CID, CSD and EXT_CSD. When displayed, clicking on “TRANS” button can toggle translation of indicated parameters.

CID (Card Identification Register):

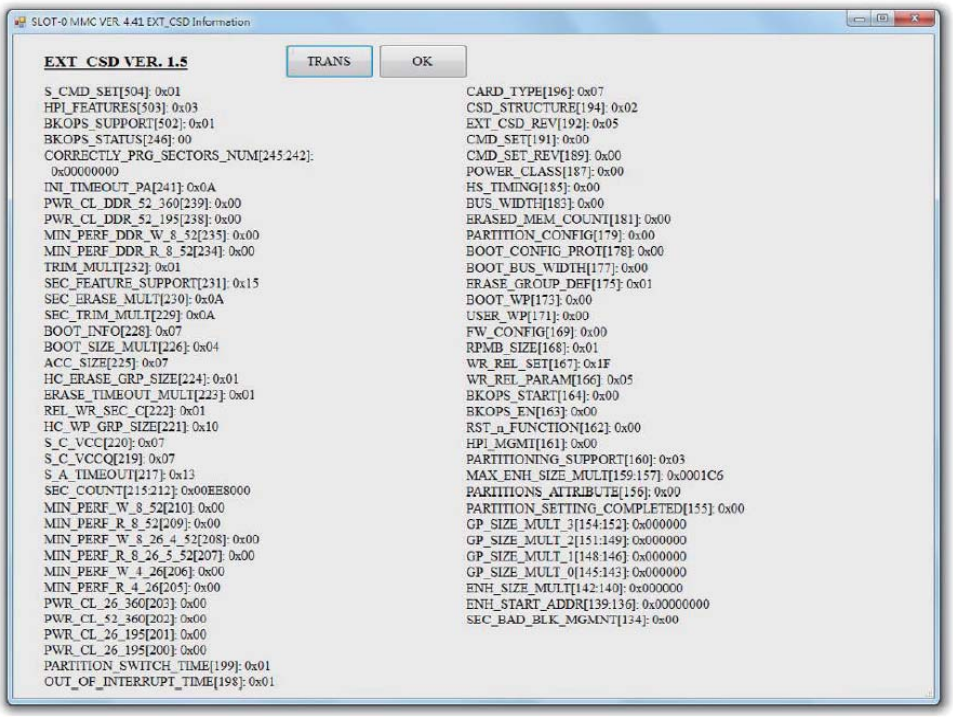


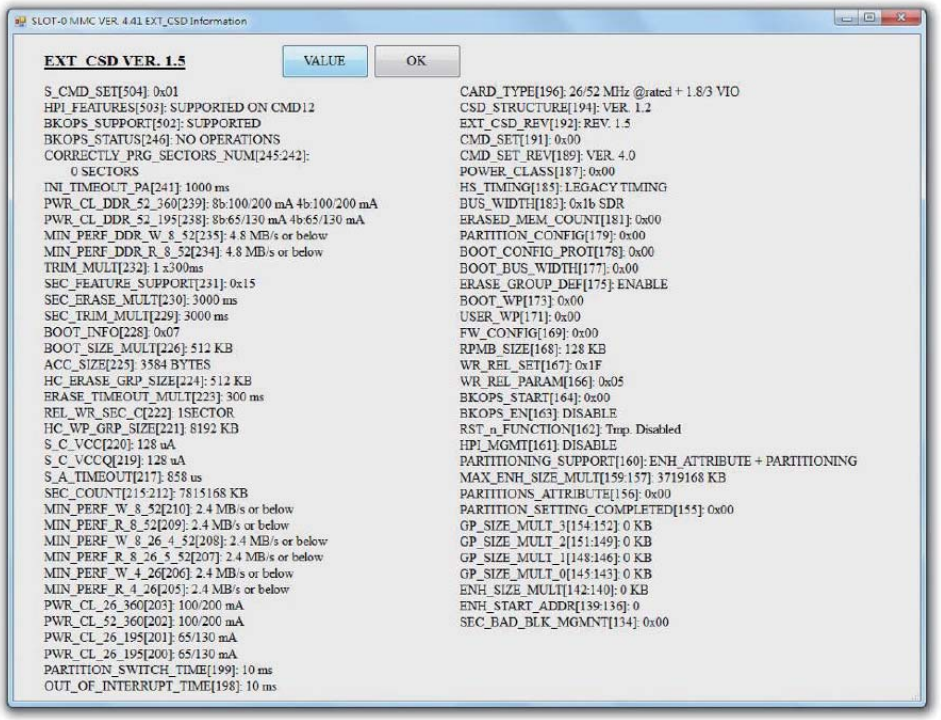
CSD (Card Status Data Register):





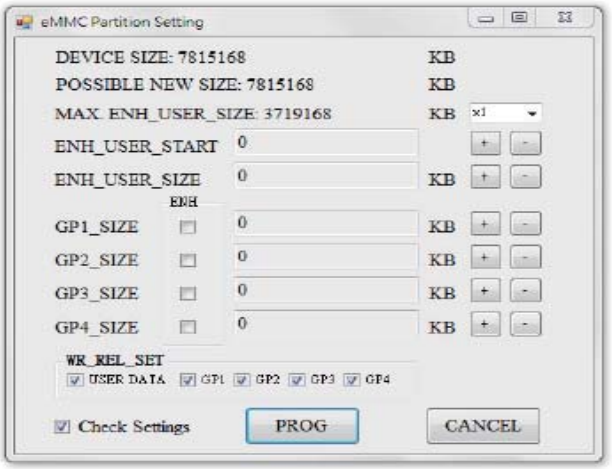
EXT_CSD (Extended Card Status Data Register):





9.3 PARTITION

Partition Setting panel is used to configure partitioning settings of eMMC. (Please be noted that partitioning is a just-for-once and nonreversible operation for eMMC.)



●DEVICE SIZE:

Indicate current device capacity.

●POSSIBLE NEW SIZE:

Indicate projected device capacity after current settings take effect.

●MAX. ENH_USER_SIZE:

Device supported maximum enhanced user size, including user data and general purpose partitions.

●x1 / x10 / x100 / x1000:

Select +/- button add/reduce unit.

●ENH_USER_START:

Logical LBA start address setting of enhanced user data area. (Press +/- to add/reduce setting.)

●ENH_USER_SIZE:

Enhance user area size setting. (Press +/- to add/reduce setting.)

●GP1 / 2 / 3 / 4_SIZE:

General purpose partition 1-4 size setting. (Press +/- to add/reduce setting.)

●ENH:

Checked to enable enhance feature of general purpose partition.

●WR_REL_SET:

For setting register “EXT_CSD[167]”; this register must be set with “EXT_CSD[156]: PARTITION_SETTING_COMPLETED” simultaneously to take effect, so it have completed with Partition Setting. This register setting will make eMMC write data with different method.

“Check” – “1” = Slower write speed, and data can be secured at power fail in the process.

“Uncheck” – “0” = Faster write speed, and data cannot be secured at power fail in the process.

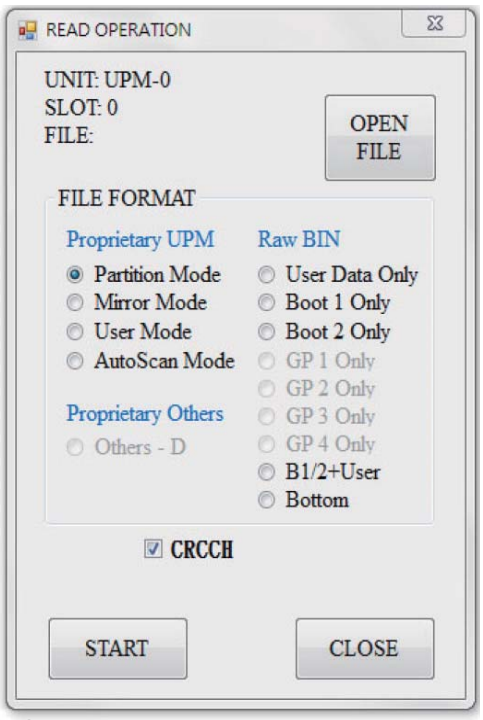
●Check Settings:

Check to activate the function of automatically checking the partition settings of eMMC.

●PROG:

Click to program finished settings to device.

9.4 READ/PROGRAM/VERIFY/AUTO



All 4 operation panel are used in the same process. READ operation panel is depicted here as an example.

●Operation Mode:

SU-6010 support 4 proprietary operation mode also used by Leap eMMC duplicator. Boot 1/2 and GP 1/2/3/4 are always included in all 4 proprietary modes.

●Partition Mode:

Operation region determined by MBR partition table entry.

●Mirror Mode:

Operation region includes all device storage partitions.

●User Mode:

Operation region depends on user defined operation size.

●AutoScan Mode:

AutoScan Mode automatically scan eMMC and record those space occupied by user data. After that operation region will depend on the user data area recorded as “occupied” in the scan list.

SU-6010 also allows user to specifically select and access only one partition in eMMC by user specified modes.

●User Data Only:

To access user data partition.

●Boot 1 / 2 Only, GP 1 / 2 / 3 / 4 Only:

To access BT-1, BT-2, GP-1, GP-2, GP-3 or GP-4 partition.

●B1/2+User: BT-1, BT-2 and USER_DATA are accessed in sequence. Size of USER_ DATA operation region is defined by user.

●Bottom: USER_DATA are accessed, yet aligned to the last sector available.

To start an operation, follow the procedures below:

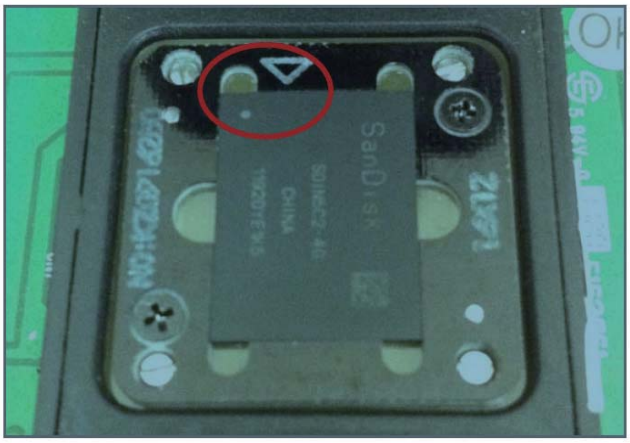
1. Click on the “OPEN FILE” button and select the image file or enter image file name.
2. Select preferred operation mode.
3. If suitable, a UserSz text box appears; enter preferred operation region size (in 100 MB).
4. Click START to begin operation.

Operation will be aborted if encountered any error condition.

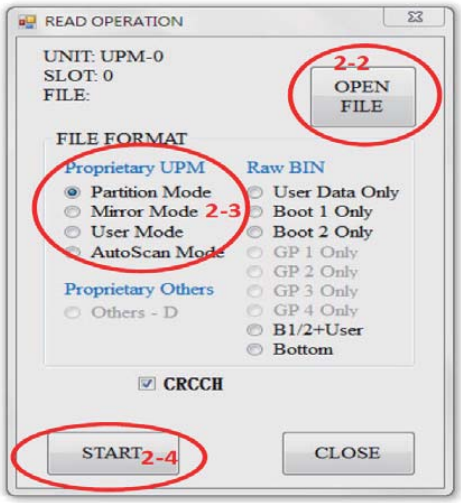
Chapter 10 SU-6010 Practical Operation

10.1 Export Data from Existing Source IC to Image File

Step 1: Put the eMMC into the socket with correct direction, and then close the socket cover.



Step 2: Click READ → Click OPEN FILE to select saving location → Select Partition/Mirror/ User/AutoScan mode → Click START

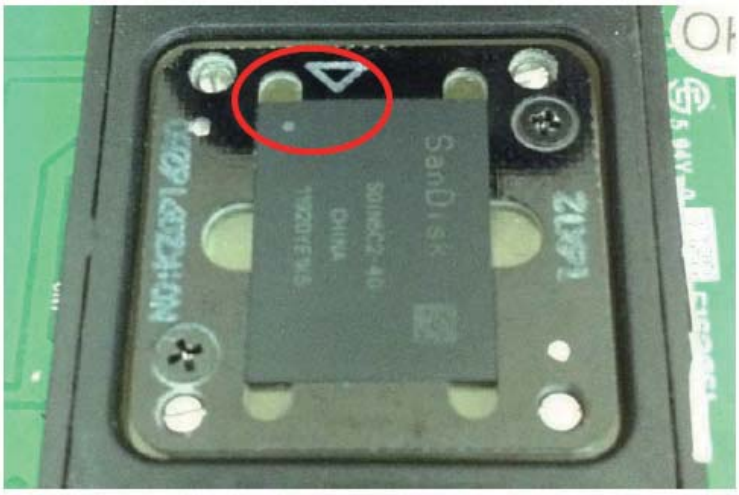


Then SU-6010 will rebuild a proprietary image file - "xxxx.upm"

Therefore all the image data, program location, EXT_CSD , and register settings, can be integrated in to one single file, along with data checksum.

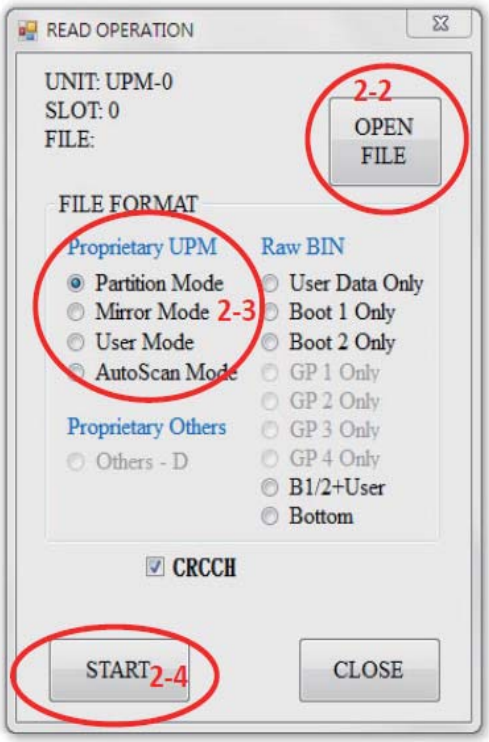
10.2 Load Data from Image File to Blank eMMC to Build a New Source IC

Step 1: Put the eMMC into the socket with correct direction, and then close the socket cover. Please be noted that the blank eMMC should be the same with the original IC (which is used for creating the UPM file) in manufacturer and ID.



Step 2: Click PROGRAM → Click OPEN FILE to select the UPM file to be programmed → Select Partition/Mirror/User/AutoScan mode (Please be noted that the mode should be the same with the mode used for creating the UPM file) → Click START

After completeting the data program, you can use VERIFY → OPEN FILE → Select same mode to do the data verification.



10.3 Manually Program RAW (BIN) Data to Blank eMMC to Build a New Source IC

Please be noted that there's no fix procedure for manual program. Prepare all the data required in the Appendix 2 is recommended, and also be noted following issues.

1. eMMC Partition Parameter Settings

Setting the capacity of GP1/2/3/4 and ENHANCE or not; setting the capacity and starting address of ENHANCE_USER area.

Parameters above can be set through the Partition function of SU-6010. (Please be noted that this operation is an OTP operation, so please be careful with this function.)

2. EXT_CSD Parameter Settings

The most common setting is PARTITION_CONFIG setting.

If the settings belong to BOOT_WP and USER_WP, they should be set after data has been correctly programmed and verified.

3. RAW File to be Programmed and its Location

There are data for BOOT-1/2, GP1/2/3/4 (if the size>0), and USER_DATA area.

There are 3 types of image for USER_DATA area: TOP-ALIGN, BOTTOM-ALIGN, and BOOT-1/2+USER.

TOP-ALIGN image means the data is sequential written from LBA-0; select User Data Only to perform programming.

BOTTOM-ALIGN image means data is counted from the end of IC's capacity, backward to the section match the capacity of image file; then sequential written from that section. Select Bottom to perform programming.

BOOT-1/2+USER image means data is sequential written from LBA-0 of BOOT-1 in IC; after BOOT-1 is full, data will continue sequential written from LBA-0 of BOOT-2; after BOOT-2 is full, data will continue sequential written from LBA-0 of USER_DATA area. Select B1/2+User to perform programming.

4. Program Operation

In application interface of SU-6010, select Program → Click OPEN FILE → Select proper mode for Raw BIN → Click START to write data into IC.

5. Verify Operation

When data program is done, select VERIFY → OPEN FILE → select the same mode to verify the data. After verify is done, BOOT_WP and USER_WP setting can be performed. (If it's necessary to do so)

6. After the source eMMC is built, the data can be exported to image file for future use.

7.Completing Source IC and Image File

Through IDENTIFY and EXT_CSD function to confirm the parameters, and then verify again from image file with same mode to confirm the data is correctly programmed.

Appendix 1 : FAQ

1.1 SU-6010 has no respond after powering on. (Power fan not revolving/Power LED not lighting)

1. Check power cord, power connector, and power plug and see if they're loosing.
2. Check power cord and see if it's well functioned.
3. Check the fuse and see if it's burnt out.
4. Check power fan and power LED and see if they're well functioned.

1.2 The System does not show correct device after connecting to PC.

1. Check the power of SU-6010 and see if it's correct connected and ensure the power switch is turn ON.
2. Check USB cable and see if it's correct connected.
3. Check USB cable and see if it's well functioned.
4. Check device driver and see if it's correct installed.

1.3 Cannot launch SU-6010 Application.

1. Check the connection of SU-6010 and see if it's correct connected to PC.
2. Check the power of SU-6010 and see if it's correct connected and ensure the power switch is turn ON.

1.4 Fail to manual program eMMC.

1. Please check all the parameters and settings of eMMC, and see if they're correct entered.

Appendix 2 : Info Required for eMMC Manual Program

eMMC IC Parameters			
IC Manufacturer		IC Model	
Total Capacity		BOOT_1/2 Capacity	
ERASE_GRP Capacity		WP_GRP Capacity	
eMMC Partition Setting			
Partition	ENHANCE or not	Capacity / Starting Address / Length	
GP1			
GP2			
GP3			
GP4			
ENH_USER			
Data to be Programmed			
Partition	File Name	Starting Address / Length	
BOOT_1			
BOOT_2			
USER_DATA TOP			
USER_DATA BOT			
GP_1			
GP_2			
GP_3			
GP_4			
Special EXT_CSD Settings			
Parameter Name	EXT_CSD Address	Setting	
PARTITION_CONFIG	[179]		
Write Protect Settings			
BOOT_WP	[173]		
USER_WP	[171]		